



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/690,704	10/23/2003	Max Shtein	10020/29701	9763
23838 7590 05/05/2008 KENYON & KENYON LLP 1500 K STREET N.W. SUITE 700 WASHINGTON, DC 20005			EXAMINER TUROCZY, DAVID P	
			ART UNIT 1792	PAPER NUMBER
			MAIL DATE 05/05/2008	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/690,704

Applicant(s)

SHEIN ET AL.

Examiner

DAVID TUROCY

Art Unit

1792

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 January 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/C)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____
- 7) ☐ Paper No(s)/Mail Date 1/18/08

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after allowance or after an Office action under *Ex Parte Quayle*, 25 USPQ 74, 453 O.G. 213 (Comm'r Pat. 1935). Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on 1/18/2008 has been entered.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on 1/18/2008 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-3, 7, 8, 11, 14, 15, 16, 17, and 18 are rejected under 35 U.S.C. 102(a) as being anticipated by Micropatterning of small molecular weight organic

semiconductor thin films using organic vapor phase deposition by Shtein et al., hereafter Shtein.

Shtein discloses a method for forming a patterned film of OLED, including pixels, wherein the process includes mixing vapors of an organic material with a carrier gas and introducing the carrier gas into the nozzle and ejecting the carrier gas and the organic material from the nozzle at a flow velocity or 10% of the thermal velocity of the carrier gas, in order to deposit the organic material on the substrate surface as pixels. Shtein discloses the background pressure of 0.1-10 torr, including forming using a vacuum (see entire reference, specifically VII page 4015). It is the examiners position that spraying in a 10 Torr pressure environment inherently results in a pressure between the substrate and the nozzle, applicants "dynamic pressure", as claimed. Shtein discloses the nozzle to substrate separation, aperture depth and size as about equal to the mean free math length (see figure 6).

5. Claims 1-3, 7, 8, 11, 14, 15, 16, 17, and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Micron-scale patterning of organic thin films using organic vapor phase deposition by Shtein et al, hereinafter "'Micron-scale patterning of organic thin films using organic vapor phase deposition'".

"Micron-scale patterning of organic thin films using organic vapor phase deposition" discloses a method for forming a patterned film of OLED, including pixels, wherein the process includes mixing vapors of an organic material with a carrier gas and introducing the carrier gas into the nozzle and ejecting the carrier gas and the

organic material from the nozzle at a flow velocity or 10% of the thermal velocity of the carrier gas, in order to deposit the organic material on the substrate surface as pixels. "Micron-scale patterning of organic thin films using organic vapor phase deposition" discloses the background pressure of 1 to 100 torr, including forming using a vacuum. It is the examiners position that spraying in a 100 Torr pressure environment inherently results in a pressure between the substrate and the nozzle, applicants "dynamic pressure", as claimed. "Micron-scale patterning of organic thin films using organic vapor phase deposition" discloses the nozzle to substrate separation as about equal to the mean free math length (see page 9, graph showing pixel shape vs. mask-substrate separation).

In the case of "Micron-scale patterning of organic thin films using organic vapor phase deposition", the examiner, broadly interpreting the term nozzle, maintains that the disclosed mask, in combination with the orifice therethrough can broadly be considered a nozzle. The application has failed to explicitly define the term nozzle and a reasonable interpretation of nozzle includes the structure as shown by "Micron-scale patterning of organic thin films using organic vapor phase deposition". See also page 12, OVJD for home office, wherein a nozzle is formed.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 1-3, 7, 8, 11, 14, 15, 16, 17, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shtein.

Claims 1-3, 7, 8, 11, 14, 15, 16, 17, and 18: While the examiner maintains the position as above, where Stein discloses a velocity of a carrier gas of 10% of the thermal velocity and pressure, it is the examiners position that the carrier velocity and the pressure are known result effective variable. If carrier velocity or pressure were to low or too high it would result in improper coating and film quality. Therefore it would have been obvious to one skill in the art at the time of the invention was made to determine the optimal value for the carrier velocity and pressure used in the process of Stein, through routine experimentation, to deposit the desired film with the desired film qualities.

Shtein discloses a method for forming a patterned film of OLED, including pixels, wherein the process includes mixing vapors of an organic material with a carrier gas and introducing the carrier gas into the nozzle and ejecting the carrier gas and the organic material from the nozzle at a flow velocity or 10% of the thermal velocity of the carrier gas, in order to deposit the organic material on the substrate surface as pixels. Shtein discloses the background pressure of 0.1-10 torr, including forming using a vacuum (see entire reference, specifically VII page 4015). It is the examiners position that spraying in a 10 Torr pressure environment inherently results in a pressure between the substrate and the nozzle, applicants "dynamic pressure", as claimed. Shtein discloses the nozzle to substrate separation, aperture depth and size as about equal to the mean free math length (see figure 6).

9. Claims 1-3, 5, 7, 8, 10, 11, 12, 14, 15, 16, 17, 18, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over "Micron-scale patterning of organic thin films using organic vapor phase deposition"

Claims 1-3, 7, 8, 11, 14, 15, 16, 17, and 18: While the examiner maintains the position as above, where "Micron-scale patterning of organic thin films using organic vapor phase deposition" discloses a velocity of a carrier gas of 10% of the thermal velocity and pressure, it is the examiners position that the carrier velocity and the pressure are known result effective variable. If carrier velocity or pressure were to low or too high it would result in improper coating and film quality. Therefore it would have been obvious to one skill in the art at the time of the invention was made to determine

the optimal value for the carrier velocity and pressure used in the process of "Micron-scale patterning of organic thin films using organic vapor phase deposition", through routine experimentation, to deposit the desired film with the desired film qualities.

Claims 5, 10, 12, 18: "Micron-scale patterning of organic thin films using organic vapor phase deposition" suggests OVJP for the home office and therefore it would have been obvious to one of ordinary skill in the art to have selected a background pressure of ambient or 760 torr because by doing so one would be able to provide OVJP to the home office without having to provide expensive vacuum systems.

10. Claims 1-3, 10, 14-18, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 4788082 by Schmitt ("Schmitt") in view of Stein et al. and "Angular Distribution of Flow from Orifices and Tubes at High Knudsen Numbers" by Stickney et al, hereafter Stickney.

Schmitt discloses a process for depositing a film using a carrier gas (Abstract). Schmitt also discloses ejecting a carrier gas, hydrogen or helium, where the flow velocity is on the order of the speed of sound of the carrier gas or about one kilometer per second, which is greater than 10% of the thermal velocity of the carrier gas (Column 19, lines 59-62). Schmitt discloses depositing organic molecules to form coatings, including polymeric coatings (Column 30, lines 21-38). Schmitt discloses depositing the organic material using an atmospheric background pressure, i.e. 760 Torr, which reads on the background pressures as claimed (Column 21, lines 31-47, Column 24, lines 49-

64). It is the examiners position that spraying in an atmospheric pressure environment inherently results in a pressure between the substrate and the nozzle, applicants "dynamic pressure", as claimed. Schmitt also discloses that though high vacuum systems are often complicated they are often utilized when depositing thin films (Column 1, line 66 – Column 2, line 3). Schmitt also discloses providing a depositing species with a molecular weight greater than the carrier gas (Column 11, lines 48-58).

Schmitt fails to disclose providing a nozzle diameter, nozzle length or a nozzle-to-substrate separation about equal to the gas mean free path length or the formation of a pattern film comprising pixels

However, Stein discloses all that is taught above, discloses OVJP is known and suitable in the art to provide pattern films, including pixels in electronic devices (page 4014). Stein discloses when the Knudsen number is 1, that is when a critical apparatus dimension (disclosed at least as nozzle length or a nozzle-to-substrate separation) is equal to the gas mean free path, a pattern film using OVJP can be predictably formed (4007-4009). Therefore, taking the references collectively, it would have been obvious to have modified Schmitt to have deposited multiple pixel film as taught by Stein using mfp equal to a critical apparatus dimension because such would lead to predictable results. Additionally, Stickney, discloses the angular distribution of the flow through an orifice, when using vacuum technology, is directly related to the Knudsen number, which is defined as the mean free path / diameter of the orifice (Page 10). Stickney discloses the angular distribution of the flow through the orifice becomes increasingly narrow, i.e. more directed, and the center-line intensity increases (page 16). Therefore

Stickney discloses the Knudsen number decreases to 1, the angular distribution narrows and the center line intensity increases. In addition, Stickney discloses angular distribution of the spray through a tubular member is a function of the length of the tube as well as the diameter of the tube (Page 16-18). Therefore Stickney clearly discloses the relationship between the orifice diameter and the mean free path of the gas is a result effective variable.

Therefore it would have been obvious to one skill in the art at the time of the invention was made to determine the optimal value for the Knudsen number, including a Knudsen number about 1, used in the process of Schmitt in view of Shtein, through routine experimentation, to provide a spray through an orifice, when using vacuum technology, with the desired angular distribution.

11. Claims 4-5, 6, 9, and 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schmitt in view Stein and Stickney and further in view of US Patent 6468605 by Shah et al. ("Shah").

Schmitt in view Stein and Stickney of teaches all the limitations of these claims as discussed above in the 35 USC 103 (a) rejection, however, Schmitt in view Stein and Stickney fails to teach providing a guard flow.

However, Shah teaches of a method for producing a high-speed jet of coating material and gaseous carrier gas (Abstract). Shah discloses providing a guard gas (24) from the nozzle surrounding the gaseous spray (Column 3, line 52-Column 4, line 6,

Figure 1). Shah discloses the guard gas facilitates screening, directing, and shaping of the spray coating to provide the appropriate coating (Column 4, lines 1-2). Shah also discloses using a guard gas including argon and nitrogen (Column 4, lines 3-4). It is the examiners position that the guard gas flow, as disclosed by Shah, would inherently affect the "dynamic pressure" or the pressure between the nozzle and the substrate.

Therefore, it would have been obvious to one skilled in the art at the time of the invention to modify Schmitt in view Stein and Stickney to use the guard flow suggested by Shah to provide a desirable high speed spray coating because Schmitt in view Stein and Stickney teaches spraying, at high speeds, a coating material entrained in a carrier gas and Shah teaches providing a guard gas provides for shaping, directing, and screening of the coating material entrained in a carrier gas. Please note that the test of obviousness is not an express suggestion of the claimed invention in any or all references, but rather what the references taken collectively would suggest to those of ordinary skill in the art presumed to be familiar with them (*In re Rosselet*, 146 USPQ 183).

Claim 9: Schmitt in view Stein and Stickney and further in view of Shah discloses using a guard gas, argon or nitrogen, which has a larger molecular weight than the carrier gas, hydrogen or helium.

12. Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schmitt in view Stein, Stickney and Shah and further in view of Kirk-Othmer Vacuum Technology "Kirk-Othmer".

Schmitt in view Stein, Stickney and Shah teaches all the limitations of these claims as discussed above in the 35 USC 103 (a) rejection, however, Schmitt in view Stickney and Shah fails to explicitly teach providing a pressure less than 0.1 Torr.

However, Kirk-Othmer, teaching of known uses of vacuum technology, discloses a high vacuum corresponds to a controlled vacuum system (Pg 750, last paragraph). In addition, Kirk-Othmer discloses using various pressures, including pressures less than 0.1 Torr, for various controlled vacuum processes (Table 1). Therefore it is the examiners position that the pressure within the vacuum is a result effective variable, which varies depending on the coating material and substrate.

Therefore it would have been obvious to one skill in the art at the time of the invention was made to determine the optimal pressure within the vacuum chamber, including less than 0.1 Torr, to deposit a thin film as disclosed by Schmitt in view Stein, Stickney and Shah, through routine experimentation, to provide the desired coating of a substrate under vacuum conditions.

13. Claims 13 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schmitt in view Stein, Stickney and Shah and further in view of US Patent 5709906 by Bickford et al. ("Bickford").

Schmitt in view Stein, Stickney and Shah teach all the limitations of these claims as discussed in the 35 USC 103 (a) rejection above. In addition, Schmitt teaches purging the system using the inert carrier gas to remove any unwanted species in the

system, which might have been there when left open to the ambient environment (Column 21, lines 31-40). However, Schmitt in view Stickney and Shah fails to teach using a glove box.

However, Bickford discloses using a chamber that either can be purged with an inert gas, using an inlet tube and one-way nozzle, or the operation can take place in a glove box under an inert atmosphere (Column 8, lines 53-56). The examiner acknowledges Bickford is directed to electrochemically reducing organic compounds, however, Bickford is only utilized here to show that an inert glove box is a known substitute for purging a chamber prior using a carrier gas. Substitution of equivalents requires no express motivation. *In re Fount*, 213 USPQ 532 (CCPA 1982); *In re Siebentritt* 152, USPQ (CCPA 1967).

Therefore, it would have been obvious to one skilled in the art at the time of the invention to modify Schmitt in view Stein, Stickney and Shah to use the glove box with an inert gas atmosphere suggested by Bickford to provide a desirable inert atmosphere without unwanted species because Schmitt in view Stein, Stickney and Shah teaches purging the spray chamber with inert gas prior to applying the coating and Bickford teaches a glove box with an inert atmosphere is a known substitute for inert gas purge of a chamber.

14. Claims 4-5, 6, 9, and 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stein in view of US Patent 6468605 by Shah et al. ("Shah").

Stein teaches all the limitations of these claims as discussed above in the 35 USC 103 (a) rejection, however, Stein fails to teach providing a guard flow.

However, Shah teaches of a method for producing a high-speed jet of coating material and gaseous carrier gas (Abstract). Shah discloses providing a guard gas (24) from the nozzle surrounding the gaseous spray (Column 3, line 52-Column 4, line 6, Figure 1). Shah discloses the guard gas facilitates screening, directing, and shaping of the spray coating to provide the appropriate coating (Column 4, lines 1-2). Shah also discloses using a guard gas including argon and nitrogen (Column 4, lines 3-4). It is the examiners position that the guard gas flow, as disclosed by Shah, would inherently affect the "dynamic pressure" or the pressure between the nozzle and the substrate.

Therefore, it would have been obvious to one skilled in the art at the time of the invention to modify Stein to use the guard flow suggested by Shah to provide a desirable high speed spray coating because Stein teaches spraying, at high speeds, a coating material entrained in a carrier gas and Shah teaches providing a guard gas provides for shaping, directing, and screening of the coating material entrained in a carrier gas. Please note that the test of obviousness is not an express suggestion of the claimed invention in any or all references, but rather what the references taken collectively would suggest to those of ordinary skill in the art presumed to be familiar with them (*In re Rosselet*, 146 USPQ 183).

Claim 9: Shah discloses using a guard gas, argon or nitrogen, which has a larger molecular weight than the carrier gas, hydrogen or helium.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DAVID TUROCY whose telephone number is (571)272-2940. The examiner can normally be reached on Monday-Friday 8:30-6:00, No 2nd Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/David Turocy/
Examiner, Art Unit 1792

/Timothy H Meeks/
Supervisory Patent Examiner, Art Unit 1792